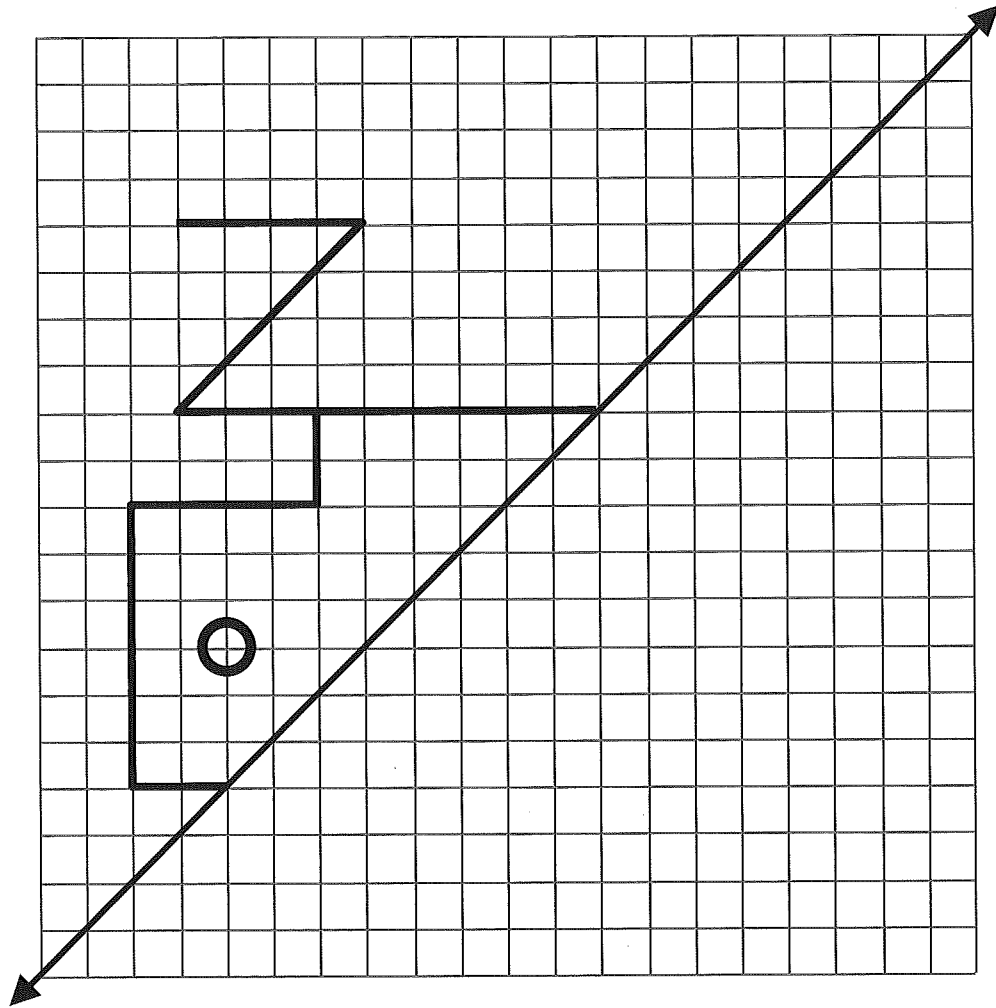


# Create the Reflection

Create the reflection of the image over the line of symmetry. Use the patty paper to verify your sketch.



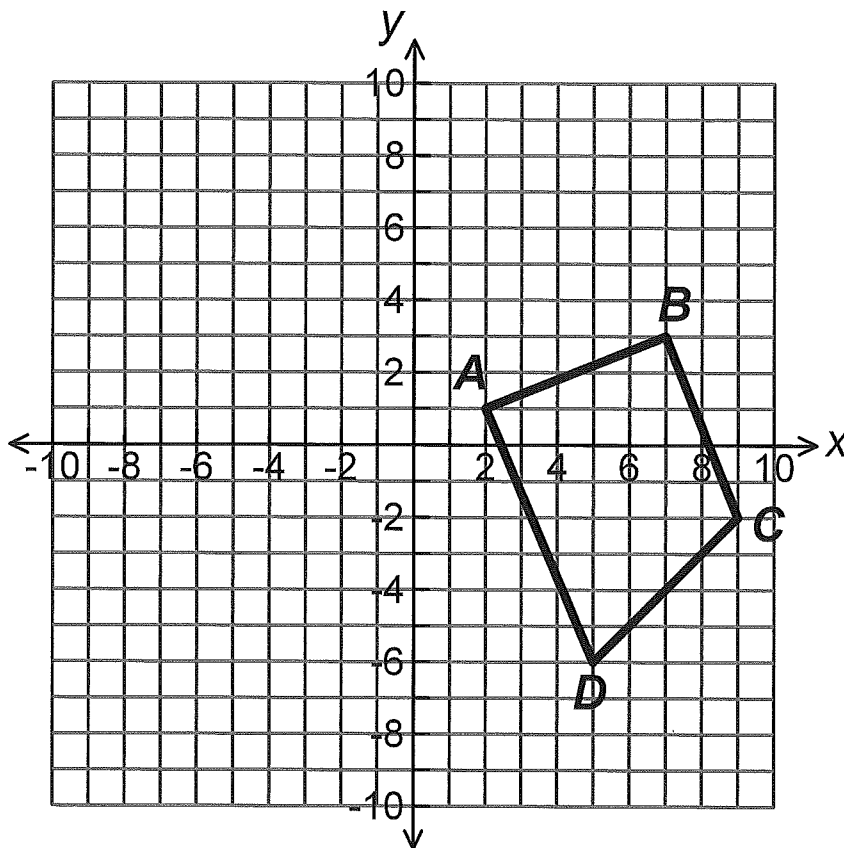


## Unit 5 Lesson 1

### Transformations

#### Transformation I

1. Sketch the translation of quadrilateral  $ABCD$  10 units to the left and 7 units up.
2. Label the vertices of the translated quadrilateral  $A'B'C'D'$ .
3. Record the coordinates of the vertices of the 2 quadrilaterals in the table and answer the questions that follow.



Original Figure	Translated Figure
$A( \quad , \quad )$	$A'( \quad , \quad )$
$B( \quad , \quad )$	$B'( \quad , \quad )$
$C( \quad , \quad )$	$C'( \quad , \quad )$
$D( \quad , \quad )$	$D'( \quad , \quad )$

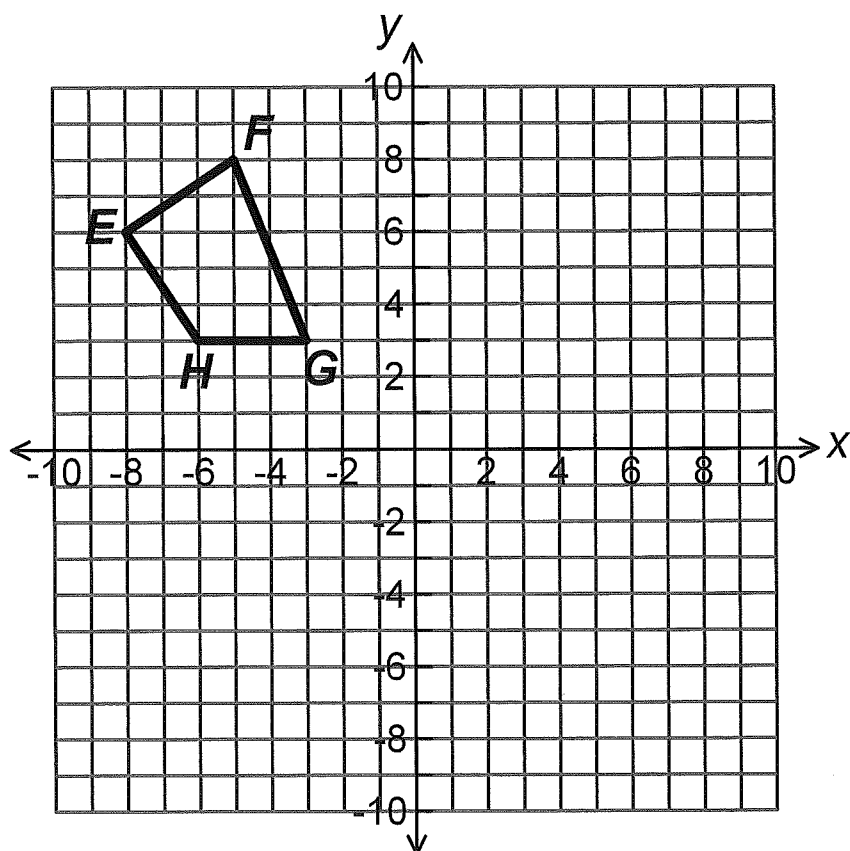
- a) How does translating a figure vertically affect the coordinates of its vertices?
- b) How does translating a figure horizontally affect the coordinates of its vertices?
- c) How does translating a figure both vertically AND horizontally affect the coordinates of its vertices?



## Transformations

### Transformation II

1. Sketch the reflection of quadrilateral  $EFGH$  across the  $x$ -axis.
2. Label the vertices of the reflected quadrilateral  $E'F'G'H'$ .
3. Record the coordinates of the vertices of the 2 quadrilaterals in the table and answer the questions that follow.



Original Figure	Reflected Figure
$E( \quad , \quad )$	$E'( \quad , \quad )$
$F( \quad , \quad )$	$F'( \quad , \quad )$
$G( \quad , \quad )$	$G'( \quad , \quad )$
$H( \quad , \quad )$	$H'( \quad , \quad )$

a) How are the coordinates of the vertices of each figure similar? Justify your answer.

b) How are the coordinates of the vertices of each figure different? Justify your answer.

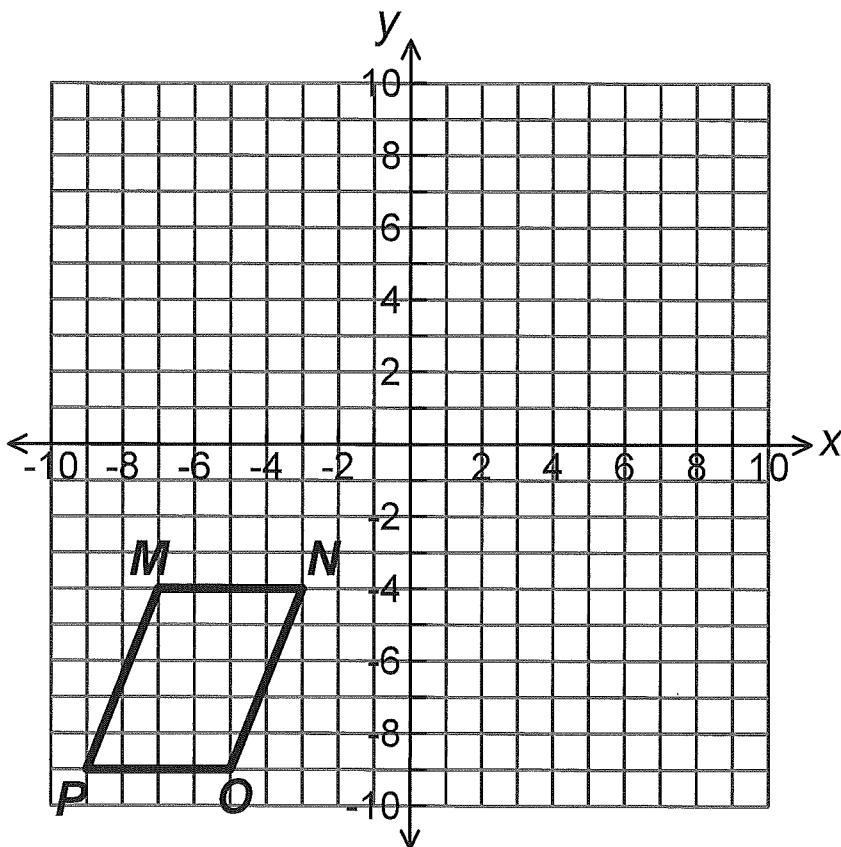


## Unit 5 Lesson 1

### Transformations

#### Transformation III

1. Sketch the reflection of quadrilateral  $MNOP$  across the  $y$ -axis.
2. Label the vertices of the reflected quadrilateral  $M'N'O'P'$ .
3. Record the coordinates of the vertices of the 2 quadrilaterals in the table and answer the questions that follow.



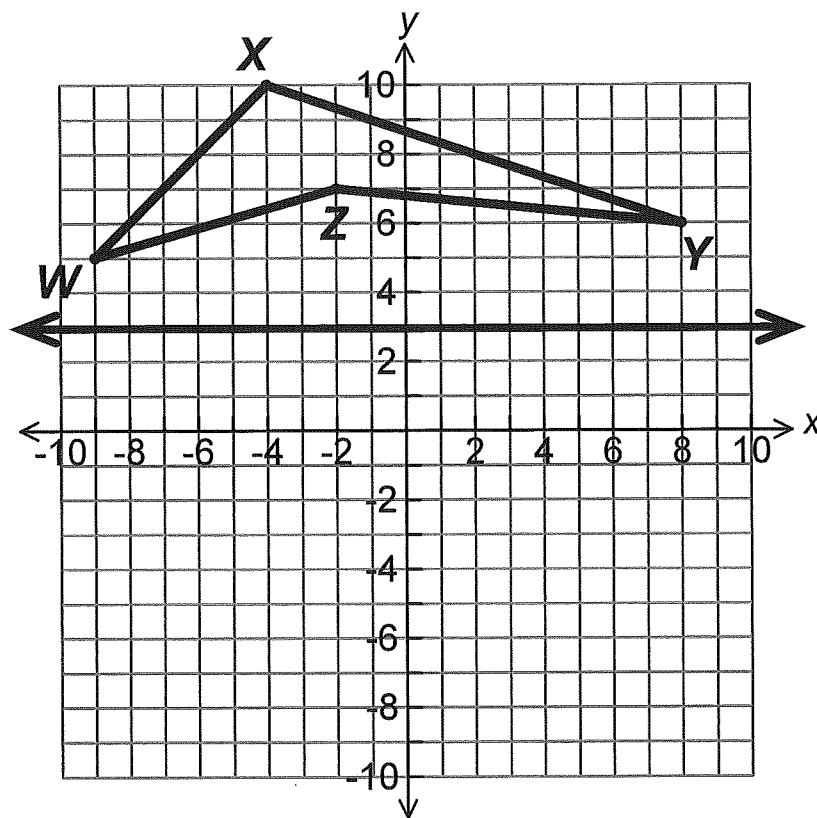
Original Figure	Reflected Figure
$M( \quad , \quad )$	$M'( \quad , \quad )$
$N( \quad , \quad )$	$N'( \quad , \quad )$
$O( \quad , \quad )$	$O'( \quad , \quad )$
$P( \quad , \quad )$	$P'( \quad , \quad )$

- a) How are the coordinates of the vertices of each figure similar? Justify your answer.
- b) How are the coordinates of the vertices of each figure different? Justify your answer.



## Reflection

1. Reflect the quadrilateral over the line shown in the graph.
2. Label the vertices of the reflected quadrilateral  $W'X'Y'Z'$ .
3. Record the coordinates of the vertices of the 2 quadrilaterals in the table and answer the questions that follow.



Original Figure	$W( \quad , \quad )$	$X( \quad , \quad )$	$Y( \quad , \quad )$	$Z( \quad , \quad )$
Reflected Figure	$W'( \quad , \quad )$	$X'( \quad , \quad )$	$Y'( \quad , \quad )$	$Z'( \quad , \quad )$

- 1 How are the coordinates of the vertices of each figure similar? Justify your answer.
- 2 How are the coordinates of the vertices of each figure different? Justify your answer.
- 3 How is reflecting over the given line similar to reflecting over the x-axis? How is it different? Justify your answer.



## Unit 5 Lesson 1

### Independent Practice

#### Translations:

Triangle  $A'B'C'$  is a translation of triangle  $ABC$ .

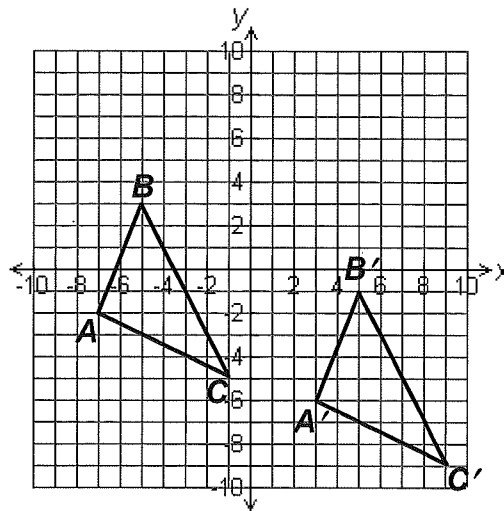
In this example, triangle  $ABC$  was translated 10 units to the right, and 4 units down.

The coordinates of the vertices of triangle  $A'B'C'$  can be found by adding 10 to each of the x-coordinates of triangle  $ABC$  and subtracting 4 from each of the y-coordinates of triangle  $ABC$ :  $(x + 10, y - 4)$ .

$$A(-7, -2) \rightarrow A'(-7 + 10, -2 - 4) \rightarrow A'(3, -6)$$

$$B(-5, 3) \rightarrow B'(-5 + 10, 3 - 4) \rightarrow B'(5, -1)$$

$$C(-1, -5) \rightarrow C'(-1 + 10, -5 - 4) \rightarrow C'(9, -9)$$



#### Reflections across a HORIZONTAL line:

Triangle  $A'B'C'$  is a reflection of triangle  $ABC$ .

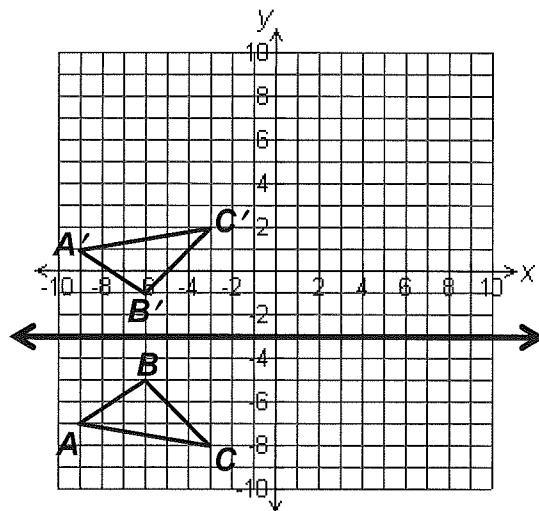
In this example, triangle  $ABC$  was reflected over the horizontal line shown in the graph.

The x-coordinates of the vertices of triangle  $A'B'C'$  are the same as the x-coordinates of triangle  $ABC$ , and the y-coordinates of the vertices of triangle  $A'B'C'$  are the same distance from the horizontal line but on the opposite side of the line of reflection.

$$A(-9, -7) \rightarrow A'(-9, 1)$$

$$B(-6, -5) \rightarrow B'(-6, -1)$$

$$C(-3, -8) \rightarrow C'(-3, 2)$$



#### Reflections across a VERTICAL line:

Triangle  $A'B'C'$  is a reflection of triangle  $ABC$ .

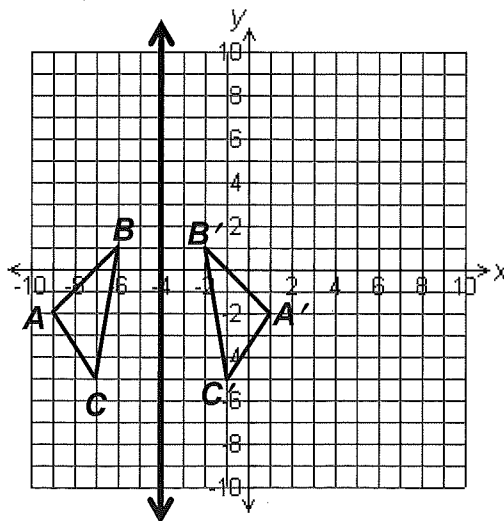
In this example, triangle  $ABC$  was reflected over the vertical line shown in the graph.

The y-coordinates of the vertices of triangle  $A'B'C'$  are the same as the y-coordinates of triangle  $ABC$ , and the x-coordinates of the vertices of triangle  $A'B'C'$  are the same distance from the vertical line but on the opposite side of the line of reflection.

$$A(-9, -2) \rightarrow A'(1, -2)$$

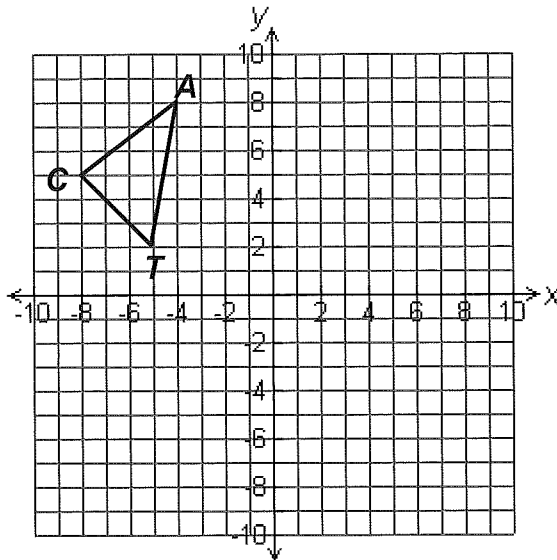
$$B(-6, 1) \rightarrow B'(-2, 1)$$

$$C(-7, -5) \rightarrow C'(-1, -5)$$



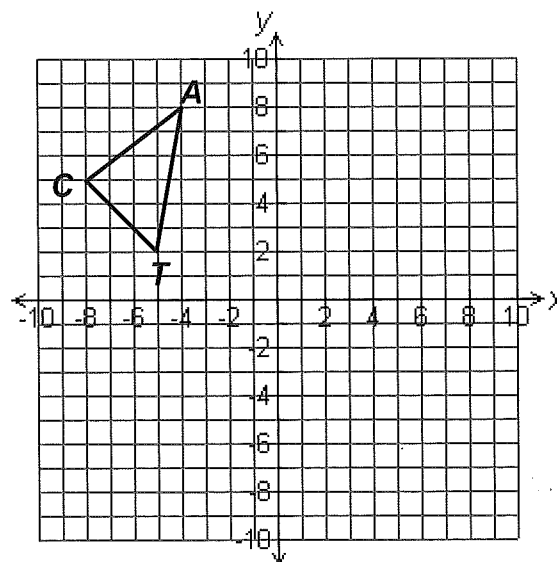


- 1 Translate triangle  $CAT$  7 units to the right and 5 units down.
  - a) Sketch the translation and label its vertices  $C'A'T'$ .
  - b) Record the coordinates of the vertices of triangle  $C'A'T'$  in the table.



Vertex	Coordinates
$C'$	
$A'$	
$T'$	

- 2 Reflect triangle  $CAT$  across the  $y$ -axis.
  - a) Sketch the reflection and label its vertices  $C'A'T'$ .
  - b) Record the coordinates of the vertices of triangle  $C'A'T'$  in the table.



Vertex	Coordinates
$C'$	
$A'$	
$T'$	

- c) In which quadrant is the original figure?
- d) In which quadrant is the reflection?

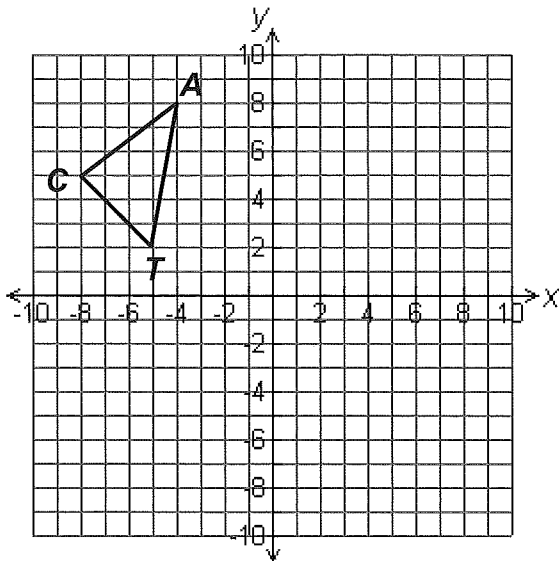


## Unit 5 Lesson 1

3 Reflect triangle  $CAT$  across the  $x$ -axis.

a) Sketch the reflection and label its vertices  $C'A'T'$ .

b) Record the coordinates of the vertices of triangle  $C'A'T'$  in the table.

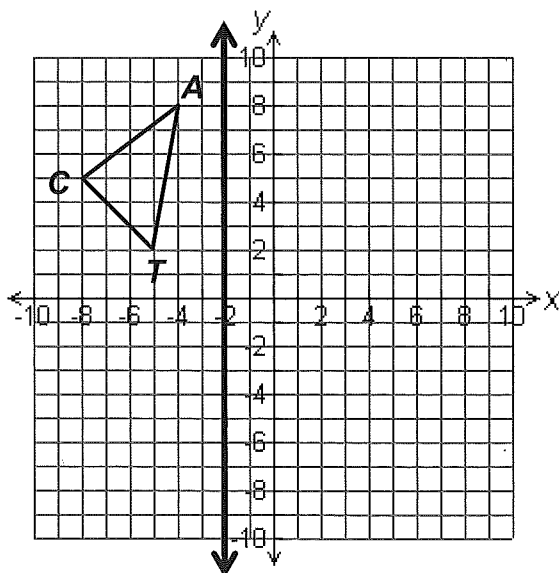


Vertex	Coordinates
$C'$	
$A'$	
$T'$	

4 Reflect triangle  $CAT$  across the line shown in the graph below.

a) Sketch the reflection and label its vertices  $C'A'T'$ .

b) Record the coordinates of the vertices of triangle  $C'A'T'$  in the table.



Vertex	Coordinates
$C'$	
$A'$	
$T'$	

5 Point  $A$  has coordinates  $(-15, 7)$  and is translated 10 units to the right and 4 units down. What are the coordinates of point  $A'$ ?





### Backwards Transformations

Quadrilateral *MATH* has been translated 12 units to the left and 18 units up. The coordinates of the vertices of quadrilateral *M'A'T'H'* are given below. What were the original coordinates of quadrilateral *MATH*? Justify your answer.

$M' (-12, 18)$

$A' (20, 8)$

$T' (14, -15)$

$H' (-23, -9)$

FOR TEACHER USE ONLY:

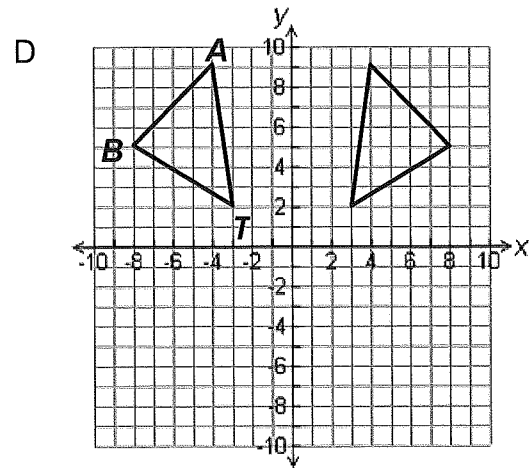
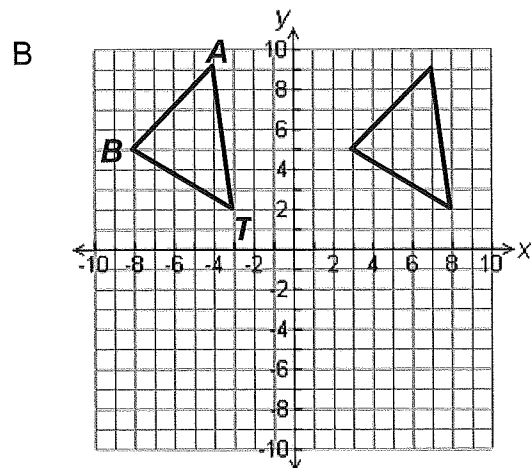
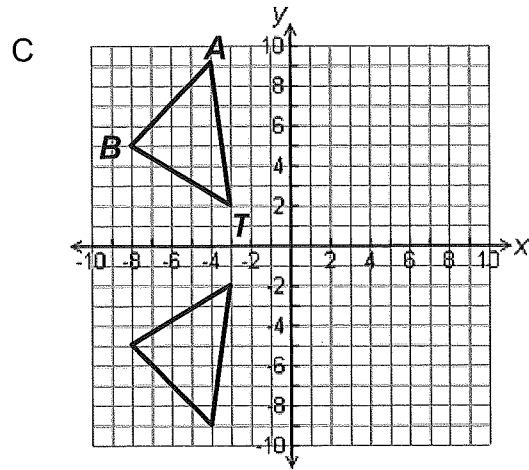
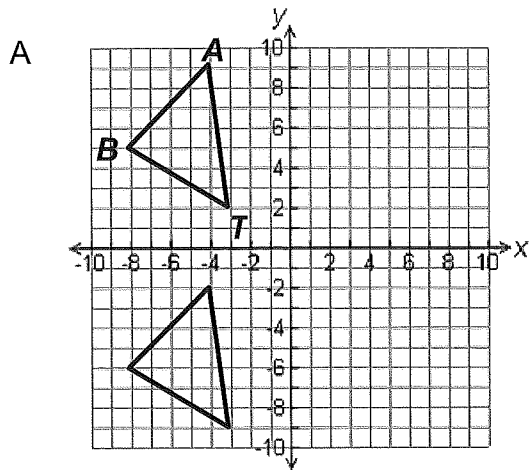
a. YES NO Student arrives at a correct solution?

	4	3	2	1
b. Conceptual Knowledge				
c. Procedural Knowledge				
d. Communication				



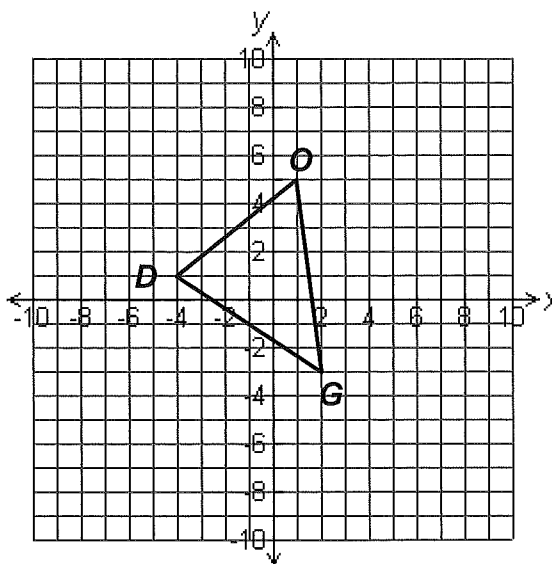
## Unit 5 Lesson 1

- 1 Triangle  $BAT$  is reflected across the  $y$ -axis. Which of the following shows this transformation?





- 2 If triangle  $DOG$  is translated 4 units down and 6 units to the left, what will be the coordinates of point  $G'$  ?

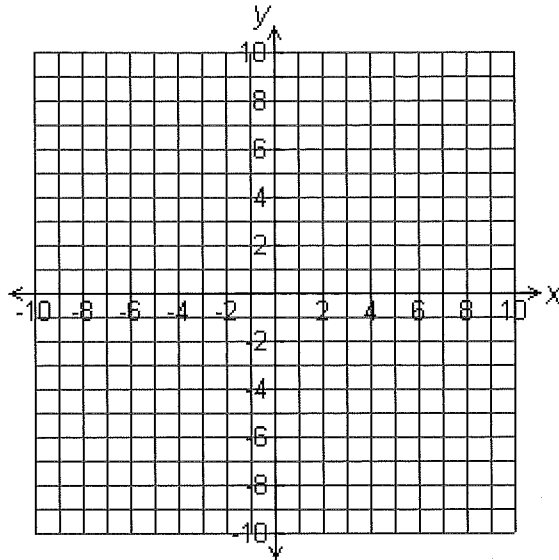


- A  $(2, -7)$
- B  $(-4, -3)$
- C  $(-4, -7)$
- D  $(8, -7)$



## Unit 5 Lesson 1

- 3 A circle with a radius of 5 units has its center at  $(-3, 4)$  on a coordinate grid.

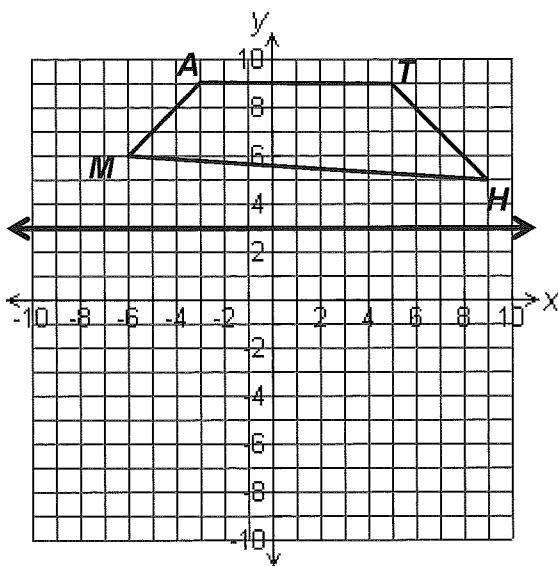


Which of the following transformations will relocate the center of the circle so that it lies in quadrant IV?

- A A reflection across the  $x$ -axis
- B A reflection across the  $y$ -axis
- C A translation 7 units to the right and 4 units down
- D A translation 4 units to the right and 7 units down



- 4 If quadrilateral  $MATH$  is reflected across the line shown below, what will be the coordinates of  $T'$ ?



- A  $(5, 9)$
- B  $(5, -3)$
- C  $(-5, 9)$
- D  $(5, 1)$